

SEQUENCE LISTING

<110> Huang, Shi
Chadwick, Robert B.

<120> Methods of Detecting and Treating
Microsatellite-Instability Positive Tumors Using RIZ

<130> P-LJ 5101

<150> US 60/256,582

<151> 2000-12-19

<160> 15

<170> FastSEQ for Windows Version 4.0

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<213> Rattus SP.

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Met His Gln Asn Thr Glu
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Ser Val Ala Ala Thr Glu Thr Leu Ala Glu Val Pro Glu His Val Leu
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Arg Gly Leu Pro Glu Glu Val Arg Leu Phe Pro Ser Ala Val Asp Lys
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Thr Arg Ile Gly Val Trp Ala Thr Lys Pro Ile Leu Lys Gly Lys Lys
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Phe Gly Pro Phe Val Gly Asp Lys Lys Lys Arg Ser Gln Val Arg Asn
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Trp Ala Cys Ser Gly Glu Glu Gln Asn Leu Phe Pro Leu Glu Ile Asn				
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Arg Ala Ile Tyr Tyr Lys Thr Leu Lys Pro Ile Ala Pro Gly Glu Glu				
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Leu Leu Val Trp Tyr Asn Gly Glu Asp Asn Pro Glu Ile Ala Ala Ala				
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att gag gaa gag cga gcc agc gcc cgg agc aag cgg agc tcc ccg aag				654
Ile Glu Glu Glu Arg Ala Ser Ala Arg Ser Lys Arg Ser Ser Pro Lys				
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Ser Arg Arg Gly Lys Lys Lys Ser His Glu Asn Lys Asn Lys Gly Ile				
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Arg Thr His Pro Thr Gln Leu Lys Ala Ser Glu Leu Asp Ser Thr Phe				
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Ala Asn Met Arg Gly Ser Ala Glu Gly Pro Lys Glu Glu Asp Glu Arg				
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Pro Leu Ala Ser Ala Pro Glu Gln Pro Ala Pro Leu Pro Glu Val Gly				
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Glu Asp Ser Pro Asp Val Thr Pro Pro Pro His Thr Pro Arg Ala Arg	
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His Cys Glu Arg Lys Phe Ala Thr Lys Gln Gly Leu Glu Arg His Met	
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His Ile His Ile Ser Thr Ile Asn His Ala Phe Lys Cys Lys Tyr Cys	
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Gly Lys Arg Phe Gly Thr Gln Ile Asn Arg Arg Arg His Glu Arg Arg	
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His Glu Thr Gly Leu Lys Arg Arg Pro Ser Met Thr Leu Gln Ser Ser	
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Ser Ser Pro Pro Gln Leu Gly Gln Asp Cys Leu Ile Leu Asn Ser Glu	
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Leu Ile Pro Lys Gly Val Arg Arg Lys Gly Gly Leu Leu Glu Glu Pro	
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Gln Pro Pro Ala Glu Gln Ala Pro Pro Ser Gln Asn Val Tyr Val Pro	
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Ser Thr Glu Pro Glu Glu Glu Gly Glu Thr Asp Asp Val Tyr Ile Met	
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Asp Ile Ser Ser Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly	
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Lys Ile Gln Thr Asn Ser Ser Thr Ser Asn Cys Asp Val Ile Glu Met	
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Glu Ser Asn Ser Ala His Leu Tyr Gly Ile Asp Cys Leu Leu Thr Pro	
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Val Thr Val Glu Ile Thr Gln Asn Ile Lys Ser Thr Gln Val Ser Val	
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Val Tyr Leu Ser Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys	
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Pro	Ala	Leu	Arg	Asp	Phe	Gly	Lys	Pro	Asn	Asp	Gly	Lys	Ala	Ala	Trp		
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Asp	Ser	Pro	Ala	Trp	Ser	Leu	Ser	Gly	Arg	Asp	Glu	Arg	Glu	Thr	Gly		
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Trp	Glu	Ser	Val	Leu	Asp	Leu	Ser	Val	His	Lys	Lys	Pro	Cys	Asp	Ser		
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Lys	Lys	Lys	Pro	Thr	Thr	Cys	Met	Leu	Gln	Lys	Val	Leu	Leu	Asn	Glu		
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Ser	Pro	Ser	Pro	Cys	Lys	Ser	Pro	Asp	Thr	Gln	Pro	Asp	Pro	Glu	Leu		
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Gly	Pro	Asp	Ser	Ser	Cys	Ser	Val	Pro	Thr	Ala	Glu	Ser	Pro	Pro	Glu		

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Val Val Gly Pro Ser Ser Pro Pro Leu Gln Thr Ala Ser Leu Ser Ser			
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ggc cag ctg cct cct ctc tta acc ccc aca gag cct tct tcc cct ccc			3054
Gly Gln Leu Pro Pro Leu Leu Thr Pro Thr Glu Pro Ser Ser Pro Pro			
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ccc tgc cct cct gtg tta act gtt gcc act cca cca cct ccc ctc ctt			3102
Pro Cys Pro Pro Val Leu Thr Val Ala Thr Pro Pro Pro Pro Leu Leu			
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cca acc gtc cct ctc tcc cac ccc tct tct gat gcc tcc cct cag cag			3150
Pro Thr Val Pro Leu Ser His Pro Ser Ser Asp Ala Ser Pro Gln Gln			
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Cys Pro Ser Pro Phe Ser Asn Thr Thr Ala Gln Ser Pro Leu Pro Ile			
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Leu Ser Pro Thr Val Ser Pro Ser Pro Ser Pro Ile Pro Pro Val Glu			
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cca ctt atg tct gct gct tcc cct ggt ccc cca aca ctt tct tcc tcc			3294
Pro Leu Met Ser Ala Ala Ser Pro Gly Pro Pro Thr Leu Ser Ser Ser			
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Ser Ser Ser Ser Ser Ser Phe Pro Ser Ser Ser Cys Ser Ser Thr Ser			
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Pro Ser Pro Pro Pro Leu Ser Ala Val Ser Ser Val Val Ser Ser Gly			
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Asp Asn Leu Glu Ala Ser Leu Pro Ala Val Thr Phe Lys Gln Glu Glu			
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Ser Glu Ser Glu Gly Leu Lys Pro Lys Glu Glu Ala Pro Pro Ala Gly			
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Gly Gln Ser Val Val Gln Glu Thr Phe Ser Lys Asn Phe Ile Cys Asn			
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gtc tgt gaa tcg cct ttt ctt tcc att aaa gac cta acc aaa cat tta			3582
Val Cys Glu Ser Pro Phe Leu Ser Ile Lys Asp Leu Thr Lys His Leu			
	1130	1135	1140

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Ser Val His Ala Glu Glu Trp Pro Phe Lys Cys Glu Phe Cys Val Gln	
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Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu Phe Ala	
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Glu Glu Pro Leu Glu Thr Ser Arg Glu Glu Glu Leu Asn Asp Ser Ser	
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Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly Ile Lys Thr	
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Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr Pro Ser Phe	
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Lys Pro Pro Pro Phe Gln Tyr His His Arg Asn Pro Met Gly Ile Gly	
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Val Thr Ala Thr Asn Phe Thr Thr His Asn Ile Pro Gln Thr Phe Thr	
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Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Ser Lys Arg Lys Val	
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Ser His Ser Ser Lys Lys Gly Gly His Ala Ser Ser Ser Ser Ser Asp	
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Arg Asn Ser Ser Cys His Pro Arg Arg Arg Thr Ala Asp Thr Glu Ile	
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Gln Asn Val Lys Phe Ala Ala Ser Val Lys Ser Lys Lys Ala Ser Ser	
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Val	Glu	Gly	Lys	Lys	Pro	Lys	Ala	Val	Ala	Lys	Ser	His	Ser	Ala	Gln	
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cga	agc	ctt	cag	ctg	gca	gct	gct	gcg	gac	ctg	agt	gaa	agc	agg	aga	5118
Arg	Ser	Leu	Gln	Leu	Ala	Ala	Ala	Ala	Asp	Leu	Ser	Glu	Ser	Arg	Arg	
1640				1645				1650								
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Glu	Asp	Ser	Ser	Ala	Arg	His	Glu	Leu	Lys	Asp	Phe	Ser	Tyr	Ser	Leu	
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Arg	Leu	Ala	Ser	Arg	Cys	Gly	Ser	Ser	Thr	Ala	Ser	Tyr	Ile	Thr	Arg	
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Gln	Cys	Arg	Lys	Val	Lys	Ala	Ala	Ala	Ala	Thr	Pro	Phe	Gln	Gly	Pro	
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Phe	Leu	Lys	Glu													
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Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys	Lys	Ser	His	Glu
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Asn	Lys	Asn	Lys	Gly	Ile	Arg	Thr	His	Pro	Thr	Gln	Leu	Lys	Ala	Ser
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Pro	Leu	Pro	Ala	Cys	Glu	Pro	Gln	Pro	Glu	Val	Asp	Gly	Lys	Gln	Glu
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Met	Ser	Asn	Glu	Ala	Arg	Glu	Asp	Ser	Pro	Asp	Val	Thr	Pro	Pro	Pro
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Gln	Pro	Leu	Asp	Leu	Ser	Ser	Gly	Val	Lys	Gln	Lys	Ser	Glu	Gly	Thr
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Glu	Pro	Ser	Ser	Pro	Pro	Pro	Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr
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 Phe Pro Ser Ala Val Asp Lys Thr Arg Ile Gly Val Trp Ala Thr Lys
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 Pro Ile Leu Lys Gly Lys Lys Phe Gly Pro Phe Val Gly Asp Lys Lys
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 Pro Asn Leu Gly Trp Met Cys Ile Asp Ala Thr Asp Pro Glu Lys Gly
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Phe Thr Thr Lys Gln Gly Leu Glu Arg His Met His Ile His Ile Ser			
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Thr Val Asn His Ala Phe Lys Cys Lys Tyr Cys Gly Lys Ala Phe Gly			
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Thr Gln Ile Asn Arg Arg Arg His Glu Arg Arg His Glu Ala Gly Leu			
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Asn Met Arg Arg His Gln Arg Arg Val His Glu Arg His Leu Ile Pro			
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Lys Gly Val Arg Arg Lys Gly Gly Leu Glu Glu Pro Gln Pro Pro Ala			
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Val Cys Pro Ser Ser Pro Ala Leu Gln Thr Pro Ser Leu Ser Ser Gly	
945 950 955 960	
cag ctg cct cct ctc ttg atc ccc aca gat ccc tct tcc cct cca ccc	3048

Gln	Leu	Pro	Pro	Leu	Leu	Ile	Pro	Thr	Asp	Pro	Ser	Ser	Pro	Pro	Pro		
				965					970					975			
tgt	ccc	ccg	gta	tta	act	gtt	gcc	act	ccg	ccc	cct	ccc	ctc	ctt	cct	3096	
Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr	Pro	Pro	Pro	Pro	Leu	Leu	Pro		
			980					985					990				
acc	gta	cct	ctt	cca	gcc	ccc	tct	tcc	agt	gca	tct	cca	cac	cca	tgc	3144	
Thr	Val	Pro	Leu	Pro	Ala	Pro	Ser	Ser	Ser	Ala	Ser	Pro	His	Pro	Cys		
			995				1000					1005					
ccc	tct	cca	ctc	tca	aat	gcc	acc	gca	cag	tcc	cca	ctt	cca	att	ctg	3192	
Pro	Ser	Pro	Leu	Ser	Asn	Ala	Thr	Ala	Gln	Ser	Pro	Leu	Pro	Ile	Leu		
	1010					1015					1020						
tcc	cca	aca	gtg	tcc	ccc	tct	ccc	tct	ccc	att	cct	ccc	gtg	gag	ccc	3240	
Ser	Pro	Thr	Val	Ser	Pro	Ser	Pro	Ser	Pro	Ile	Pro	Pro	Val	Glu	Pro		
1025					1030					1035				1040			
ctg	atg	tct	gcc	gcc	tca	ccc	ggg	cct	cca	aca	ctt	tct	tct	tcc	tcc	3288	
Leu	Met	Ser	Ala	Ala	Ser	Pro	Gly	Pro	Pro	Thr	Leu	Ser	Ser	Ser	Ser		
				1045				1050						1055			
tct	tca	tct	tcc	tcc	tcc	tct	tcc	ttt	tct	tct	tca	tct	tcc	tcc	tct	3336	
Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Ser	Ser		
			1060					1065					1070				
tct	cct	tct	cca	cct	cct	ctc	tcc	gca	ata	tca	tct	gtt	gtt	tcc	tct	3384	
Ser	Pro	Ser	Pro	Pro	Pro	Leu	Ser	Ala	Ile	Ser	Ser	Val	Val	Ser	Ser		
			1075				1080					1085					
ggt	gat	aat	ctg	gag	gct	tct	ctc	ccc	atg	ata	tct	ttc	aaa	cag	gag	3432	
Gly	Asp	Asn	Leu	Glu	Ala	Ser	Leu	Pro	Met	Ile	Ser	Phe	Lys	Gln	Glu		
	1090					1095					1100						
gaa	tta	gag	aat	gaa	ggt	ctg	aaa	ccc	agg	gaa	gag	ccc	cag	tct	gct	3480	
Glu	Leu	Glu	Asn	Glu	Gly	Leu	Lys	Pro	Arg	Glu	Glu	Pro	Gln	Ser	Ala		
1105					1110				1115						1120		
gct	gaa	cag	gat	gtt	gtt	gtt	cag	gaa	aca	ttc	aac	aaa	aac	ttt	gtt	3528	
Ala	Glu	Gln	Asp	Val	Val	Val	Gln	Glu	Thr	Phe	Asn	Lys	Asn	Phe	Val		
				1125				1130					1135				
tgc	aac	gtc	tgt	gaa	tca	cct	ttt	ctt	tcc	att	aaa	gat	cta	acc	aaa	3576	
Cys	Asn	Val	Cys	Glu	Ser	Pro	Phe	Leu	Ser	Ile	Lys	Asp	Leu	Thr	Lys		
			1140					1145					1150				
cat	tta	tct	att	cat	gct	gaa	gaa	tgg	ccc	ttc	aaa	tgt	gaa	ttt	tgt	3624	
His	Leu	Ser	Ile	His	Ala	Glu	Glu	Trp	Pro	Phe	Lys	Cys	Glu	Phe	Cys		
			1155				1160					1165					
gtg	cag	ctt	ttt	aag	gat	aaa	acg	gac	ttg	tca	gaa	cat	cgc	ttt	ttg	3672	
Val	Gln	Leu	Phe	Lys	Asp	Lys	Thr	Asp	Leu	Ser	Glu	His	Arg	Phe	Leu		

1170	1175	1180	
ctt cat gga gtt ggg aat atc ttt gtg tgt tct gtt tgt aaa aaa gaa			3720
Leu His Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu			
1185	1190	1195	1200
ttt gct ttt ttg tgc aat ttg cag cag cac cag cga gat ctc cac cca			3768
Phe Ala Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro			
	1205	1210	1215
gat aag gtg tgc aca cat cac gag ttt gaa agc ggg act ctg agg ccc			3816
Asp Lys Val Cys Thr His His Glu Phe Glu Ser Gly Thr Leu Arg Pro			
	1220	1225	1230
cag aac ttt aca gat ccc agc aag gcc cat gta gag cat atg cag agc			3864
Gln Asn Phe Thr Asp Pro Ser Lys Ala His Val Glu His Met Gln Ser			
	1235	1240	1245
ttg cca gaa gat cct tta gaa act tct aaa gaa gaa gag gag tta aat			3912
Leu Pro Glu Asp Pro Leu Glu Thr Ser Lys Glu Glu Glu Glu Leu Asn			
	1250	1255	1260
gat tcc tct gaa gag ctt tac acg act ata aaa ata atg gct tct gga			3960
Asp Ser Ser Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly			
1265	1270	1275	1280
ata aag aca aaa gat cca gat gtt cga ttg ggc ctc aat cag cat tac			4008
Ile Lys Thr Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr			
	1285	1290	1295
cca agc ttt aaa cca cct cca ttt cag tac cat cac cgt aac ccc atg			4056
Pro Ser Phe Lys Pro Pro Pro Phe Gln Tyr His His Arg Asn Pro Met			
	1300	1305	1310
ggg att ggt gtg aca gcc aca aat ttc act aca cac aat att cca cag			4104
Gly Ile Gly Val Thr Ala Thr Asn Phe Thr Thr His Asn Ile Pro Gln			
	1315	1320	1325
act ttc act acc gcc att cgc tgc aca aag tgt gga aaa ggt gtc gac			4152
Thr Phe Thr Thr Ala Ile Arg Cys Thr Lys Cys Gly Lys Gly Val Asp			
	1330	1335	1340
aat atg ccg gag ttg cac aaa cat atc ctg gct tgt gct tct gca agt			4200
Asn Met Pro Glu Leu His Lys His Ile Leu Ala Cys Ala Ser Ala Ser			
1345	1350	1355	1360
gac aag aag agg tac acg cct aag aaa aac cca gta cca tta aaa caa			4248
Asp Lys Lys Arg Tyr Thr Pro Lys Lys Asn Pro Val Pro Leu Lys Gln			
	1365	1370	1375
act gtg caa ccc aaa aat ggc gtg gtg gtt tta gat aac tct ggg aaa			4296
Thr Val Gln Pro Lys Asn Gly Val Val Val Leu Asp Asn Ser Gly Lys			
	1380	1385	1390

aat gcc ttc cga cga atg gga cag ccc aaa agg ctt aac ttt agt gtt	4344
Asn Ala Phe Arg Arg Met Gly Gln Pro Lys Arg Leu Asn Phe Ser Val	
1395 1400 1405	
gag ctc agc aaa atg tcg tcg aat aag ctc aaa tta aat gca ttg aag	4392
Glu Leu Ser Lys Met Ser Ser Asn Lys Leu Lys Leu Asn Ala Leu Lys	
1410 1415 1420	
aaa aaa aat cag cta gta cag aaa gca att ctt cag aaa aac aaa tct	4440
Lys Lys Asn Gln Leu Val Gln Lys Ala Ile Leu Gln Lys Asn Lys Ser	
1425 1430 1435 1440	
gca aag cag aag gcc gac ttg aaa aat gct tgt gag tca tcc tct cac	4488
Ala Lys Gln Lys Ala Asp Leu Lys Asn Ala Cys Glu Ser Ser Ser His	
1445 1450 1455	
atc tgc cct tac tgt aat cga gag ttc act tac att gga agc ctg aat	4536
Ile Cys Pro Tyr Cys Asn Arg Glu Phe Thr Tyr Ile Gly Ser Leu Asn	
1460 1465 1470	
aaa cac gcc gcc ttc agc tgt ccc aaa aaa ccc ctt tct cct ccc aaa	4584
Lys His Ala Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Pro Lys	
1475 1480 1485	
aaa aaa gtt tct cat tca tct aag aaa ggt gga cac tca tca cct gca	4632
Lys Lys Val Ser His Ser Ser Lys Lys Gly Gly His Ser Ser Pro Ala	
1490 1495 1500	
agt agt gac aaa aac agt aac agc aac cac cgc aga cgg aca gcg gat	4680
Ser Ser Asp Lys Asn Ser Asn Ser Asn His Arg Arg Arg Thr Ala Asp	
1505 1510 1515 1520	
gcg gag att aaa atg caa agc atg cag act ccg ttg ggc aag acc aga	4728
Ala Glu Ile Lys Met Gln Ser Met Gln Thr Pro Leu Gly Lys Thr Arg	
1525 1530 1535	
gcc cgc agc tca ggc ccc acc caa gtc cca ctt ccc tcc tca tcc ttc	4776
Ala Arg Ser Ser Gly Pro Thr Gln Val Pro Leu Pro Ser Ser Ser Phe	
1540 1545 1550	
agg tcc aag cag aac gtc aag ttt gca gct tcg gtg aaa tcc aaa aaa	4824
Arg Ser Lys Gln Asn Val Lys Phe Ala Ala Ser Val Lys Ser Lys Lys	
1555 1560 1565	
cca agc tcc tcc tct tta agg aac tcc agc ccg ata aga atg gcc aaa	4872
Pro Ser Ser Ser Ser Leu Arg Asn Ser Ser Pro Ile Arg Met Ala Lys	
1570 1575 1580	
ata act cat gtt gag ggg aaa aaa cct aaa gct gtg gcc aag aat cat	4920
Ile Thr His Val Glu Gly Lys Lys Pro Lys Ala Val Ala Lys Asn His	
1585 1590 1595 1600	

tct gct cag ctt tcc agc aaa aca tcg cgg agc ctg cac gtg agg gta 4968
Ser Ala Gln Leu Ser Ser Lys Thr Ser Arg Ser Leu His Val Arg Val
1605 1610 1615

cag aaa agc aaa gct gtt tta caa agc aaa tcc acc ttg gcg agt aag 5016
Gln Lys Ser Lys Ala Val Leu Gln Ser Lys Ser Thr Leu Ala Ser Lys
1620 1625 1630

aaa aga aca gac cgg ttc aat ata aaa tct aga gag cgg agt ggg ggg 5064
Lys Arg Thr Asp Arg Phe Asn Ile Lys Ser Arg Glu Arg Ser Gly Gly
1635 1640 1645

cca gtc acc cgg agc ctt cag ctg gca gct gct gct gac ttg agt gag 5112
Pro Val Thr Arg Ser Leu Gln Leu Ala Ala Ala Asp Leu Ser Glu
1650 1655 1660

aac aag aga gag gac ggc agc gcc aag cag gag ctg aag gac ttc agc 5160
Asn Lys Arg Glu Asp Gly Ser Ala Lys Gln Glu Leu Lys Asp Phe Ser
1665 1670 1675 1680

tac agc ctc cgc ttg gcg tcc cga tgc tct cca cca gcc gcc tct tac 5208
Tyr Ser Leu Arg Leu Ala Ser Arg Cys Ser Pro Pro Ala Ala Ser Tyr
1685 1690 1695

atc acc agg cag tat agg aag gtc aaa gct ccg gct gca gcc cag ttc 5256
Ile Thr Arg Gln Tyr Arg Lys Val Lys Ala Pro Ala Ala Gln Phe
1700 1705 1710

cag gga cca ttc ttc aaa gag tagacactct ggctgctccc tgacagcacc 5307
Gln Gly Pro Phe Lys Glu
1715

tgaagtgacc tggaaatcagt gaagccaaag ggactggcag tctgcctgca gggagtaccg 5367
acctatccca gttgtgtgag gctgcgagag aaagggagtg catgtgcgcg cgtgcatgtg 5427
tgcggtgcgtg tgtgttcacg tgttctcgtg cgggcccgtga gtggtcttca aacgagggtc 5487
ccgaaccccc gggcggcagg aagggggcgc actccacgct gtcctttggg atgatacttg 5547
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acatggaaaa ccccttcct t 5868

<210> 4

<211> 1719

<212> PRT

<213> Homo sapien

<400> 4

Met Asn Gln Asn Thr Thr Glu Pro Val Ala Ala Thr Glu Thr Leu Ala
1 5 10 15
Glu Val Pro Glu His Val Leu Arg Gly Leu Pro Glu Glu Val Arg Leu
20 25 30

Phe	Pro	Ser	Ala	Val	Asp	Lys	Thr	Arg	Ile	Gly	Val	Trp	Ala	Thr	Lys	35	40	45
Pro	Ile	Leu	Lys	Gly	Lys	Lys	Phe	Gly	Pro	Phe	Val	Gly	Asp	Lys	Lys	50	55	60
Lys	Arg	Ser	Gln	Val	Lys	Asn	Asn	Val	Tyr	Met	Trp	Glu	Val	Tyr	Tyr	65	70	75
Pro	Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro	Glu	Lys	Gly	85	90	95
Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	Glu	Gln	Asn	100	105	110
Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	Thr	Leu	Lys	115	120	125
Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp	130	135	140
Asn	Pro	Glu	Ile	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	Ser	Ala	Arg		145	150	155
Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Lys	Gly	Lys	Lys	Lys	Ser	Gln	165	170	175
Glu	Asn	Lys	Asn	Lys	Gly	Asn	Lys	Ile	Gln	Asp	Ile	Gln	Leu	Lys	Thr	180	185	190
Ser	Glu	Pro	Asp	Phe	Thr	Ser	Ala	Asn	Met	Arg	Asp	Ser	Ala	Glu	Gly	195	200	205
Pro	Lys	Glu	Asp	Glu	Glu	Lys	Pro	Ser	Ala	Ser	Ala	Leu	Glu	Gln	Pro	210	215	220
Ala	Thr	Leu	Gln	Glu	Val	Ala	Ser	Gln	Glu	Val	Pro	Pro	Glu	Leu	Ala	225	230	235
Thr	Pro	Ala	Pro	Ala	Trp	Glu	Pro	Gln	Pro	Glu	Pro	Asp	Glu	Arg	Leu	245	250	255
Glu	Ala	Ala	Ala	Cys	Glu	Val	Asn	Asp	Leu	Gly	Glu	Glu	Glu	Glu	Glu	260	265	270
Glu	Glu	Glu	Glu	Asp	Glu	Glu	Glu	Glu	Asp	Asp	Asp	Asp	Asp	Asp	Glu	275	280	285
Leu	Glu	Asp	Glu	Gly	Glu	Glu	Glu	Ala	Ser	Met	Pro	Asn	Glu	Asn	Ser	290	295	300
Val	Lys	Glu	Pro	Glu	Ile	Arg	Cys	Asp	Glu	Lys	Pro	Glu	Asp	Leu	Leu	305	310	315
Glu	Glu	Pro	Lys	Thr	Thr	Ser	Glu	Glu	Thr	Leu	Glu	Asp	Cys	Ser	Glu	325	330	335
Val	Thr	Pro	Ala	Met	Gln	Ile	Pro	Arg	Thr	Lys	Glu	Glu	Ala	Asn	Gly	340	345	350
Asp	Val	Phe	Glu	Thr	Phe	Met	Phe	Pro	Cys	Gln	His	Cys	Glu	Arg	Lys	355	360	365
Phe	Thr	Thr	Lys	Gln	Gly	Leu	Glu	Arg	His	Met	His	Ile	His	Ile	Ser	370	375	380
Thr	Val	Asn	His	Ala	Phe	Lys	Cys	Lys	Tyr	Cys	Gly	Lys	Ala	Phe	Gly	385	390	395
Thr	Gln	Ile	Asn	Arg	Arg	Arg	His	Glu	Arg	Arg	His	Glu	Ala	Gly	Leu	405	410	415
Lys	Arg	Lys	Pro	Ser	Gln	Thr	Leu	Gln	Pro	Ser	Glu	Asp	Leu	Ala	Asp	420	425	430
Gly	Lys	Ala	Ser	Gly	Glu	Asn	Val	Ala	Ser	Lys	Asp	Asp	Ser	Ser	Pro	435	440	445
Pro	Ser	Leu	Gly	Pro	Asp	Cys	Leu	Ile	Met	Asn	Ser	Glu	Lys	Ala	Ser			

450		455		460
Gln Asp Thr Ile Asn Ser Ser Val Val Glu Glu Asn Gly Glu Val Lys				
465		470		475
Glu Leu His Pro Cys Lys Tyr Cys Lys Lys Val Phe Gly Thr His Thr				480
	485		490	
Asn Met Arg Arg His Gln Arg Arg Val His Glu Arg His Leu Ile Pro				495
	500		505	
Lys Gly Val Arg Arg Lys Gly Gly Leu Glu Glu Pro Gln Pro Pro Ala				510
	515		520	
Glu Gln Ala Gln Ala Thr Gln Asn Val Tyr Val Pro Ser Thr Glu Pro				525
	530		535	
Glu Glu Glu Gly Glu Ala Asp Asp Val Tyr Ile Met Asp Ile Ser Ser				540
545		550		555
Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly Lys Ile Gln Thr				560
	565		570	
Asn Asn Asn Thr Ser Asn Cys Asp Val Ile Glu Met Glu Ser Ala Ser				575
	580		585	
Ala Asp Leu Tyr Gly Ile Asn Cys Leu Leu Thr Pro Val Thr Val Glu				590
	595		600	
Ile Thr Gln Asn Ile Lys Thr Thr Gln Val Pro Val Thr Glu Asp Leu				605
	610		615	
Pro Lys Glu Pro Leu Gly Ser Thr Asn Ser Glu Ala Lys Lys Arg Arg				620
625		630		635
Thr Ala Ser Pro Pro Ala Leu Pro Lys Ile Lys Ala Glu Thr Asp Ser				640
	645		650	
Asp Pro Met Val Pro Ser Cys Ser Leu Ser Leu Pro Leu Ser Ile Ser				655
	660		665	
Thr Thr Glu Ala Val Ser Phe His Lys Glu Lys Ser Val Tyr Leu Ser				670
	675		680	
Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys Leu Thr Pro Pro				685
	690		695	
Ala Gly Ile Ser Ala Thr Glu Ile Ala Lys Leu Gly Pro Val Cys Val				700
705		710		715
Ser Ala Pro Ala Ser Met Leu Pro Val Thr Ser Ser Arg Phe Lys Arg				720
	725		730	
Arg Thr Ser Ser Pro Pro Ser Ser Pro Gln His Ser Pro Ala Leu Arg				735
	740		745	
Asp Phe Gly Lys Pro Ser Asp Gly Lys Ala Ala Trp Thr Asp Ala Gly				750
	755		760	
Leu Thr Ser Lys Lys Ser Lys Leu Glu Ser His Ser Asp Ser Pro Ala				765
	770		775	
Trp Ser Leu Ser Gly Arg Asp Glu Arg Glu Thr Val Ser Pro Pro Cys				780
785		790		795
Phe Asp Glu Tyr Lys Met Ser Lys Glu Trp Thr Ala Ser Ser Ala Phe				800
	805		810	
Ser Ser Val Cys Asn Gln Gln Pro Leu Asp Leu Ser Ser Gly Val Lys				815
	820		825	
Gln Lys Ala Glu Gly Thr Gly Lys Thr Pro Val Gln Trp Glu Ser Val				830
	835		840	
Leu Asp Leu Ser Val His Lys Lys His Cys Ser Asp Ser Glu Gly Lys				845
	850		855	
Glu Phe Lys Glu Ser His Ser Val Gln Pro Thr Cys Ser Ala Val Lys				860
865		870		875
				880

Lys Arg Lys Pro Thr Thr Cys Met Leu Gln Lys Val Leu Leu Asn Glu
 885 890 895
 Tyr Asn Gly Ile Asp Leu Pro Val Glu Asn Pro Ala Asp Gly Thr Arg
 900 905 910
 Ser Pro Ser Pro Cys Lys Ser Leu Glu Ala Gln Pro Asp Pro Asp Leu
 915 920 925
 Gly Pro Gly Ser Gly Phe Pro Ala Pro Thr Val Glu Ser Thr Pro Asp
 930 935 940
 Val Cys Pro Ser Ser Pro Ala Leu Gln Thr Pro Ser Leu Ser Ser Gly
 945 950 955 960
 Gln Leu Pro Pro Leu Leu Ile Pro Thr Asp Pro Ser Ser Pro Pro Pro
 965 970 975
 Cys Pro Pro Val Leu Thr Val Ala Thr Pro Pro Pro Pro Leu Leu Pro
 980 985 990
 Thr Val Pro Leu Pro Ala Pro Ser Ser Ser Ala Ser Pro His Pro Cys
 995 1000 1005
 Pro Ser Pro Leu Ser Asn Ala Thr Ala Gln Ser Pro Leu Pro Ile Leu
 1010 1015 1020
 Ser Pro Thr Val Ser Pro Ser Pro Ser Pro Ile Pro Pro Val Glu Pro
 1025 1030 1035 1040
 Leu Met Ser Ala Ala Ser Pro Gly Pro Pro Thr Leu Ser Ser Ser Ser
 1045 1050 1055
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 1060 1065 1070
 Ser Pro Ser Pro Pro Pro Leu Ser Ala Ile Ser Ser Val Val Ser Ser
 1075 1080 1085
 Gly Asp Asn Leu Glu Ala Ser Leu Pro Met Ile Ser Phe Lys Gln Glu
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 Glu Leu Glu Asn Glu Gly Leu Lys Pro Arg Glu Glu Pro Gln Ser Ala
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 Ala Glu Gln Asp Val Val Val Gln Glu Thr Phe Asn Lys Asn Phe Val
 1125 1130 1135
 Cys Asn Val Cys Glu Ser Pro Phe Leu Ser Ile Lys Asp Leu Thr Lys
 1140 1145 1150
 His Leu Ser Ile His Ala Glu Glu Trp Pro Phe Lys Cys Glu Phe Cys
 1155 1160 1165
 Val Gln Leu Phe Lys Asp Lys Thr Asp Leu Ser Glu His Arg Phe Leu
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 Leu His Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu
 1185 1190 1195 1200
 Phe Ala Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro
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 Asp Lys Val Cys Thr His His Glu Phe Glu Ser Gly Thr Leu Arg Pro
 1220 1225 1230
 Gln Asn Phe Thr Asp Pro Ser Lys Ala His Val Glu His Met Gln Ser
 1235 1240 1245
 Leu Pro Glu Asp Pro Leu Glu Thr Ser Lys Glu Glu Glu Glu Leu Asn
 1250 1255 1260
 Asp Ser Ser Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly
 1265 1270 1275 1280
 Ile Lys Thr Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr
 1285 1290 1295
 Pro Ser Phe Lys Pro Pro Pro Phe Gln Tyr His His Arg Asn Pro Met

Gly	Ile	Gly	Val	Thr	Ala	Thr	Asn	Phe	Thr	Thr	His	Asn	Ile	Pro	Gln	
		1315					1320					1325				
Thr	Phe	Thr	Thr	Ala	Ile	Arg	Cys	Thr	Lys	Cys	Gly	Lys	Gly	Val	Asp	
	1330					1335					1340					
Asn	Met	Pro	Glu	Leu	His	Lys	His	Ile	Leu	Ala	Cys	Ala	Ser	Ala	Ser	
1345					1350					1355					1360	
Asp	Lys	Lys	Arg	Tyr	Thr	Pro	Lys	Lys	Asn	Pro	Val	Pro	Leu	Lys	Gln	
			1365					1370						1375		
Thr	Val	Gln	Pro	Lys	Asn	Gly	Val	Val	Val	Leu	Asp	Asn	Ser	Gly	Lys	
		1380						1385					1390			
Asn	Ala	Phe	Arg	Arg	Met	Gly	Gln	Pro	Lys	Arg	Leu	Asn	Phe	Ser	Val	
	1395						1400					1405				
Glu	Leu	Ser	Lys	Met	Ser	Ser	Asn	Lys	Leu	Lys	Leu	Asn	Ala	Leu	Lys	
	1410					1415				1420						
Lys	Lys	Asn	Gln	Leu	Val	Gln	Lys	Ala	Ile	Leu	Gln	Lys	Asn	Lys	Ser	
1425				1430					1435						1440	
Ala	Lys	Gln	Lys	Ala	Asp	Leu	Lys	Asn	Ala	Cys	Glu	Ser	Ser	Ser	His	
			1445					1450						1455		
Ile	Cys	Pro	Tyr	Cys	Asn	Arg	Glu	Phe	Thr	Tyr	Ile	Gly	Ser	Leu	Asn	
		1460						1465					1470			
Lys	His	Ala	Ala	Phe	Ser	Cys	Pro	Lys	Lys	Pro	Leu	Ser	Pro	Pro	Lys	
	1475						1480				1485					
Lys	Lys	Val	Ser	His	Ser	Ser	Lys	Lys	Gly	Gly	His	Ser	Ser	Pro	Ala	
	1490					1495			1500							
Ser	Ser	Asp	Lys	Asn	Ser	Asn	Ser	Asn	His	Arg	Arg	Arg	Thr	Ala	Asp	
1505				1510					1515						1520	
Ala	Glu	Ile	Lys	Met	Gln	Ser	Met	Gln	Thr	Pro	Leu	Gly	Lys	Thr	Arg	
			1525					1530						1535		
Ala	Arg	Ser	Ser	Gly	Pro	Thr	Gln	Val	Pro	Leu	Pro	Ser	Ser	Ser	Phe	
	1540							1545					1550			
Arg	Ser	Lys	Gln	Asn	Val	Lys	Phe	Ala	Ala	Ser	Val	Lys	Ser	Lys	Lys	
	1555						1560					1565				
Pro	Ser	Ser	Ser	Ser	Leu	Arg	Asn	Ser	Ser	Pro	Ile	Arg	Met	Ala	Lys	
	1570					1575				1580						
Ile	Thr	His	Val	Glu	Gly	Lys	Lys	Pro	Lys	Ala	Val	Ala	Lys	Asn	His	
1585				1590					1595						1600	
Ser	Ala	Gln	Leu	Ser	Ser	Lys	Thr	Ser	Arg	Ser	Leu	His	Val	Arg	Val	
			1605					1610						1615		
Gln	Lys	Ser	Lys	Ala	Val	Leu	Gln	Ser	Lys	Ser	Thr	Leu	Ala	Ser	Lys	
		1620						1625				1630				
Lys	Arg	Thr	Asp	Arg	Phe	Asn	Ile	Lys	Ser							

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<211> 116
<212> PRT
<213> Homo sapien

<400> 5
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Gly Lys Lys Phe Gly Pro Phe Val Gly Asp Lys Lys Lys Arg Ser Gln
20 25 30
Val Lys Asn Asn Val Tyr Met Trp Glu Val Tyr Tyr Pro Asn Leu Gly
35 40 45
Trp Met Cys Ile Asp Ala Thr Asp Pro Glu Lys Gly Asn Trp Leu Arg
50 55 60
Tyr Val Asn Trp Ala Cys Ser Gly Glu Glu Gln Asn Leu Phe Pro Leu
65 70 75 80
Glu Ile Asn Arg Ala Ile Tyr Tyr Lys Thr Leu Lys Pro Ile Ala Pro
85 90 95
Gly Glu Glu Leu Leu Val Trp Tyr Asn Gly Glu Asp Asn Pro Glu Ile
100 105 110
Ala Ala Ala Ile
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<400> 6
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Leu Lys Asp Leu Gln
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Leu Gly Arg Arg Ala Arg
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<211> 391
<212> DNA

<213> Mus musculus

<220>

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<222> (1)...(390)

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Val	Tyr	Tyr	Pro	Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro	
1				5				10					15			

gag	aag	ggc	aac	tgg	ctc	cgc	tat	gtg	aac	tgg	gct	tgc	tca	gga	gaa	96
Glu	Lys	Gly	Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	
			20					25					30			

gaa	cag	aat	tta	ttt	cca	ctg	gaa	atc	aac	aga	gcc	att	tac	tat	aaa	144
Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	
		35					40					45				

acc	tta	aag	cca	atc	gcg	cct	ggc	gag	gag	ctc	ctg	gtc	tgg	tac	aat	192
Thr	Leu	Lys	Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	
	50					55					60					

ggg	gaa	gac	aac	ccc	gag	ata	gca	gct	gcg	att	gag	gaa	gag	cga	gcc	240
Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	
65					70				75					80		

agc	gcc	cgg	agc	aag	cgg	agc	tcc	ccg	aag	agc	cgg	aga	ggg	aag	aag	288
Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys	
				85					90					95		

aaa	tca	cag	gag	aat	aaa	aac	aaa	ggc	atc	aga	acc	cag	gct	gca	gcg	336
Lys	Ser	Gln	Glu	Asn	Lys	Asn	Lys	Gly	Ile	Arg	Thr	Gln	Ala	Ala	Ala	
			100					105					110			

cgg	aag	gcg	agc	gag	ctg	gac	tcc	acc	tct	gca	aac	atg	agg	ggc	tct	384
Arg	Lys	Ala	Ser	Glu	Leu	Asp	Ser	Thr	Ser	Ala	Asn	Met	Arg	Gly	Ser	
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gca	gaa	g														391
Ala	Glu															
		130														

<210> 9

<211> 130

<212> PRT

<213> Mus musculus

<400> 9

Val	Tyr	Tyr	Pro	Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro
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Glu	Lys	Gly	Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu

	20		25		30										
Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys
	35		40		45										
Thr	Leu	Lys	Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn
	50		55		60										
Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala
65			70		75									80	
Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys
			85		90									95	
Lys	Ser	Gln	Glu	Asn	Lys	Asn	Lys	Gly	Ile	Arg	Thr	Gln	Ala	Ala	Ala
	100		105		110										
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<213> Artificial Sequence

<220>

<223> synthetic primer

<400> 10

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18

<210> 11

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<212> DNA

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<223> synthetic primer

<400> 11

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18

<210> 12

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<211> 20

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<223> synthetic primer

tctcacatct gcccttactg

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<213> Artificial Sequence

<223> synthetic primer

gtgatgagtg tccacctttc

20